Available online at www.sciencedirect.com

SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 61 (2012) 50 – 51

Procedia
Social and Behavioral Sciences

Academy of Aphasia 2012

Subcortical Activity During Verbal Selection and Suppression in Parkinson's Disease

Copland D.[a,*], Bell P.[a], McMahon K.[a], Dissanayaka N.[a], Mellick G.[b], Silburn P.[a]

[a] *The University of Queensland*
[b] *Griffith University*

Introduction

Difficulties in verbal suppression during language production have been observed in Parkinson's disease and these deficits may be ameliorated by stimulation of the subthalamic nucleus (Castner et al., 2007). These findings suggest a possible subcortical or frontostriatal contribution to such deficits, yet the exact neural mechanisms involved are unknown. The present study aimed to investigate brain activity during performance of a verbal suppression task in individuals with Parkinson's disease.

Methods

Seven individuals diagnosed with idiopathic Parkinson's disease by a neurologist and 12 age, gender, and education matched healthy controls participated in an fMRI study involving three conditions. In the verbal *suppression* condition, participants were required to complete sentence stems with responses that were unrelated in any way to the preceding sentence stem. In the verbal *selection* condition, participants were required to complete sentences in which the last word was omitted (sentence stems) with contextually appropriate responses, while the *baseline* condition involved reading aloud the written final word of sentences. The fMRI acquisition method interleaved the administration of each sentence stem with the acquisition of EPI volumes. Whole brain T2*-weighted EPI volumes were acquired on a Bruker 4T MRI scanner following the administration of each sentence stem. Image preprocessing and analysis was conducted with SPM8 (with correct trials only included in analysis). Region of interest (ROI) analyses were conducted onanatomic subcortical ROI.Mean percentage BOLD signal change extracted from each ROI was compared between control and PD groups for each contrast of interest ($p<.05$).

Results

The PD group demonstrated significantly poorer accuracy in the verbal *suppression* condition compared to controls. The imaging analyses revealed that, for the Suppression>Baseline contrast, PD patients showed reduced activation, compared to controls, in the caudate bilaterally, and the left internal globus pallidus. The PD group also showed significantly reduced activity in the right caudate and the left internal globus pallidus compared to the control group for the *selection> baseline* contrast. There were no significant differences observed in mean percentage signal change for selected ROIs in the direct suppression versus selection contrast.

Discussion

The findings of this preliminary study implicate components of subcortical circuitry including the caudate and

* Corresponding author.
E-mail address: d.copland@uq.edu.au .

1877-0428 © 2012 Published by Elsevier Ltd. Selection and/or peer-review under responsibility of The Academy of Aphasia
Open access under CC BY-NC-ND license. doi:10.1016/j.sbspro.2012.10.074

globus pallidus in verbal production deficits in PD. The similar findings for the selection and suppression conditions and the lack of differences when directly comparing these conditions suggests that this subcortical dysfunction may contribute to problems involved in verbal selection based on contextual constraints rather than verbal suppression exclusively.

References

Castner, J. E., Chenery, H. J., Copland, D. A., Coyne, T. J., Sinclair, F., and Silburn, P. A. (2007) Semantic and Affective Priming as a Function of Stimulation of the Subthalamic Nucleus in Parkinson's Disease. *Brain,* 130, 1395-1407.